CLAIMS

1. An apparatus for use in the determination of a condition or state of an object based on quasi-elastic interaction between the object and light transmitted to the object, comprising:

- a beam splitter arrangement for splitting an incoming light beam of wavelength, λ, into a diffracted light beam and an undiffracted light beam, the beam splitter arrangement comprising a first and a second diffractive member,
- the first diffractive member transforming the light beam emitted by the light source into the diffracted and the undiffracted light beams,
- the second diffractive member receiving the diffracted light beam and diffracting the received light beam in a direction substantially parallel to the undiffracted light beam from the first diffractive member,

wherein the diffracted light beam, after being diffracted by the second diffractive member, and the undiffracted light beam from the first diffractive member are separated by a distance, d, said distance, d, being dependent on wavelength, λ.

2. An apparatus according to claim 1, wherein distance, d, is substantially linear dependent on wavelength, λ.

3. An apparatus according to claim 1, wherein the first and second diffractive members are diffraction gratings.

4. An apparatus according to claim 3, wherein the diffraction gratings have substantially identical grating constants.

5. An apparatus according to claim 4, wherein the diffraction gratings are surface relief gratings.

6. An apparatus according to claim 4, wherein the diffraction gratings in combination diffract the incoming light beam in such a way that approximately 50% of the intensity of the incoming light beam is contained in the undiffracted light beam from the first diffractive member, and that approximately 50% of the intensity of the incoming light beam is contained in the light beam diffracted from the second diffractive member.

7. An apparatus according to claim 1, further comprising a set of reflective members, said set of reflective members being inserted in the undiffracted beam of the first diffractive member and producing a redirected beam substantially parallel to the diffracted beam of the second diffractive member and thereby altering the distance d.

8. An apparatus according to claim 7, wherein the set of reflective members is formed by two reflective members, such as two reflective mirrors.

9. An apparatus according to claim 7, wherein the set of reflective members is formed by two diffractive reflective members, such as two reflective linear gratings.

10. An apparatus according to claim 1, further comprising a set of diffractive transmission members, said set of diffractive transmission members being inserted in the undiffracted beam of the first diffractive member and producing a redirected beam substantially parallel to the diffracted beam of the second diffractive member and thereby altering the distance d.

11. An apparatus according to claim 10, wherein the set of diffractive transmission members is formed by two transmission gratings having substantially identical grating constants, such as transmission surface relief gratings.

12. An apparatus according to claims 1, further comprising a detector, the detector being adapted to, via first and second diffractive members, detect light that has interacted with the object, the detection being performed in such a way that light from at least two measurement points on a surface of the object interfere on the detector, whereby the rotational speed of the object may be determined.

13. An apparatus according to claim 1, further comprising a detector, the detector being adapted to, via first and second diffractive members, detect light that has interacted with the object, the detection being performed in such a way that light from at least two measurement points on a surface of the object interfere on the detector, whereby a tilting of the object may be determined.

14. An apparatus according to claim 1, further comprising a refractive member inserted in the propagation paths of the diffracted and undiffracted light beams, said refractive member being adapted to change the propagation directions of the diffracted and undiffracted light beams so that the beams, in an intersection region, form a measurement volume having a fringe spacing being substantially independent of wavelength, λ, the measurement volume being substantially fixed in space.

15. An apparatus according to claim 14, wherein the refractive member is a focusing lens, the intersection region falling within the beam-waist of the two beams.

16. An apparatus according to claim 1, further comprising a receiver for receiving light that has interacted with the object.

17. An apparatus according to claim 14, further comprising a receiver for receiving light that has interacted with the object wherein the refractive member forms part of the receiver.

18. An apparatus according to claim 16, further comprising a processor operatively connected to the receiver for determining the condition or state of the object based on the detected light.

19. An apparatus according to claim 1, further comprising a light source for emission of the incoming light beam.

20. An apparatus according to claim 19, further comprising means for collimating the emitted light beam.

21. An apparatus according to claim 19, wherein the light source emits light between 400 and 10600 nm.

22. An apparatus according to claim 19, wherein the light source is a substantially monochromatic light source.

23. An apparatus according to claim 22, wherein the light source is a laser.

24. An apparatus according to claim 22, wherein the light source is a laser diode.

25. A flow sensor for measuring flow velocity of a fluid, the flow sensor comprising an apparatus according to claim 1.

26. A flow sensor according to claim 25, wherein the fluid is a gas.

27. A flow sensor according to claim 25, wherein the fluid is a liquid.

28. A velocity sensor for measuring a surface velocity of an object, the velocity sensor comprising an apparatus according to claim 1.

29. A method for the determination of a condition or state of an object based on quasi-elastic interaction between the object and light transmitted to the object, the method comprising the steps of:

- providing a beam splitter arrangement for splitting an incoming light beam of wavelength, λ, into a diffracted light beam and an undiffracted light beam, the beam splitter arrangement comprising a first and a second diffractive member,
- the first diffractive member transforming the light beam emitted by the light source into the diffracted and the undiffracted light beams,
- the second diffractive member receiving the diffracted light beam and diffracting the received light beam in a direction substantially parallel to the undiffracted light beam from the first diffractive member,

wherein the diffracted light beam, after being diffracted by the second diffractive member, and the undiffracted light beam from the first diffractive member are separated by a distance, d, said distance, d, being dependent on wavelength, λ.